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RESEARCH ARTICLE

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# Colorectal Cancer Screening among Korean Americans in Chicago: Does It Matter Whether They had the Screening in Korea or the US?

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## Abstract

**Background:** Colorectal cancer (CRC) is one of the most common cancers in Korean Americans (KAs) and CRC screening can detect CRC early and may reduce the incidence of CRC by leading to removal of precancerous polyps. Many KAs in the US leave the country, primarily to travel to Korea, for health screening. The aim of this study was to (a) assess CRC screening rates, including fecal occult blood test (FOBT), flexible sigmoidoscopy, and colonoscopy and (b) explore factors related to these tests among KAs by location of CRC screening. **Methods:** Descriptive and correlational research design with cross-sectional surveys was used with 210 KAs. Socio-demographics (age, gender, years in the US, marital status, education, employment, household income, and proficiency in spoken English), access to health care (health insurance and usual source of health care), and location of CRC screening utilization (Korea, the US, or both Korea and US) were measured and analyzed using descriptive statistics and multinomial logistic regression. **Results:** Out of 133 KA participants who had had lifetime CRC screening (i.e., had ever had FOBT, flexible sigmoidoscopy, or colonoscopy), 19% had visited Korea and undergone CRC screening in their lifetimes. Among socio-demographic factors and access to health care factors, having a usual source of health care in the US (OR=8.45) was significantly associated with having undergone lifetime CRC screening in the US. Having health insurance in the US and having had lifetime CRC screening in the US were marginally significant (OR=2.54). **Conclusion:** Access to health care in the US is important for KAs to have CRC screening in the US. As medical tourism has been increasing globally, the location of CRC screening utilization must be considered in research on cancer screening to determine correlates of CRC screening.

**Keywords:** Colorectal cancer- screening- Korean Americans- medical tourism

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## Introduction

Korean Americans (KAs) constitute one of the fastest-growing Asian groups in the U.S. The KA population increased from 799,000 to 1,700,000 between 1990 and 2010 (U.S. Census Bureau, 2001; US Census Bureau, 2012). Among Asian American/Pacific Islander groups, KAs represent 9.9% of the total Asian American population (US Census Bureau, 2012). Colorectal cancer (CRC) was the second most commonly diagnosed cancer for both KA men and women (Gomez et al., 2013). Compared to other racial and ethnic groups in the US, KAs have higher incidence rates than non-Hispanic whites and Asian Americans. Because CRC incidence can be decreased through CRC screening for the early detection of precancerous polyps and cancers, the US Preventive Services Task Force (2017) has recommended that individuals aged 50 to 75 years at average risk for developing CRC have an annual fecal occult blood test (FOBT), a flexible sigmoidoscopy every 5 years, or

a colonoscopy every 10 years. However, KAs consistently had lower rates of CRC screening utilization than whites, African Americans, Latinos, and other Asian subgroups, including Chinese, Filipino, Japanese, and Vietnamese in the US (Homayoon et al., 2013; Lee et al., 2011; Maxwell and Crespi, 2009).

Although previous studies have examined CRC screening behavior among KAs (Jo et al., 2008; Jo et al., 2017; Juon et al., 2003; Kim et al., 1998; Lu et al., 2016; Maxwell et al., 2000; Oh et al., 2013), researchers have not considered where KAs undergo their CRC screening. Approximately 750,000 US residents travel abroad for health care each year, according to the Centers for Disease Control and Prevention (Deloitte, 2008). A large number of medical tourists are immigrants in the US returning to their home country for care (Deloitte, 2008). In fact, many KAs in the US leave the country, primarily to travel to Korea, to obtain health-screening packages at a lower price than in the US (Ko et al., 2016; Oh et al., 2014). Despite the large number of KAs having

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health check-ups in Korean health care services in Korea, previous cancer screening studies (Jo et al., 2008; Jo et al., 2017; Juon et al., 2003; Kim et al., 1998; Lu et al., 2016; Maxwell et al., 2000; Oh et al., 2013) have asked the question, "Have you had CRC screening?" and have used this as an outcome variable, without asking the participants about where they had the CRC screening. Studies that have reported CRC screening might have included both KA medical tourists who traveled to Korea for CRC screening as well as those who had CRC screening in the US. But the characteristics of KAs screened in Korea could be different from the characteristics of those who have had CRC screening in the US. For example, not having a usual source of health care and health insurance in the US (defined as access to health care) could force persons to travel to Korea for CRC screening. In fact, studies on medical tourism report that medical tourists often do not have access to health care (Gan and Frederick, 2013; Karuppan and Karuppan, 2010). In this situation, KA medical tourists who were asked the question, "Have you had CRC screening?" would say "yes" if they had undergone CRC screening in Korea. However, they would more likely answer "no" to the question about whether they have health insurance, which would make it difficult to identify associations between having the access to health care in the US and CRC screening utilization. Because of these limitations, research needs to be conducted with KAs to examine CRC screening test options by location of screening, such as in Korea or the US. To date, CRC screening rates and factors associated with CRC screening for KAs by location of screening have not been investigated, although this information is essential to accurately determine factors associated with CRC screening behaviors to improve low CRC screening rates for this group. The purpose of this study was (a) to assess CRC screening rates, including FOBT, flexible sigmoidoscopy, and colonoscopy by location of CRC screening including Korea, US, or both countries, and (b) to explore factors related to these tests among KAs by location of CRC screening. This will help us identify the relationship between medical tourism and CRC screening behaviors among KAs. This is the first study to investigate CRC screening for KAs by location of screening, and knowledge gained from this study can make an important contribution to better understanding and predicting the international care accessed by immigrant populations including KAs.

## Materials and Methods

### Study design

A descriptive and correlational research design with a cross-sectional survey was used to assess CRC screening rates and to explore factors related to CRC screening tests among KAs by location of CRC screening.

### Participants

The sample for this study included KAs who were: born in Korea, immigrants to the US, fluent in spoken Korean, aged 50 and older, and at average risk of CRC (such as who had no history of Crohn's disease, ulcerative colitis, CRC, or first-degree relative with

CRC) according to ACS guidelines (American Cancer Society, 2017). A total of 210 KAs living in the Chicago metropolitan area, which has one of the largest KA populations in the US, participated in this study.

### Ethical considerations

After the Institutional Review Board at the University approved the research protocol, the survey was conducted in the Chicago metropolitan area. Written consent forms that included the purpose and procedures of the study, possible benefits to and risks of participation in the study, and a statement about the protection of privacy and confidentiality were given to participants. Participants were informed that they could withdraw from the study at any time without any consequences of any kind. Participant ID numbers, rather than personal identifiers such as names, were used for participants in the survey.

### Measures

Socio-demographics (age, gender, years in the US, marital status, education, employment, household income, and level of spoken English); access to health care (health insurance and usual source of health care); and CRC screening utilization by location (Korea, the US, or both Korea and the US) were measured. All the socio-demographic measures except level of spoken English and access to health care measures were adapted from previous studies (Lee et al., 2016; Menon et al., 2007). Among the socio-demographic variables, we measured years in the US (length of time in the US) as a continuous variable and then categorized it as more than or less than 20 years because we wanted to compare our results with those of previous studies. Household income was measured as a categorical variable because income questions are sensitive to ask and studies have shown that the item nonresponse to income questions is 20% - 40% (Tourangeau and Yan, 2007). Having health insurance, such as commercial insurance, Medicare, or Medicaid, and usual source of care (i.e., a regular doctor or a regular place to go for health care) was measured as a proxy of access to health care. FOBT, flexible sigmoidoscopy, and colonoscopy utilization were measured as the outcome variables of this study. Participants were asked for the time and place of each CRC screening test. We first asked participants whether they had undergone each CRC screening test in their lifetime. If they answered 'yes', we asked them if they had it either in Korea, the US, or both Korea and the US. Lifetime CRC screening (had undergone either FOBT, flexible sigmoidoscopy, or colonoscopy) and up-to-date (had undergone either FOBT in the previous year, flexible sigmoidoscopy in the previous 5 years, or colonoscopy in the previous 10 years) were calculated according to the ACS guidelines on CRC screening (American Cancer Society, 2017). This study was conducted with a Korean language questionnaire after the English version of the scales was translated into Korean by three bilingual translators using a committee translation method.

### Data collection

The PI recruited a convenience sample of participants from a Korean church and two community centers in the Chicago metropolitan area. The PI explained the project and asked KAs to participate in the survey. If they were eligible and agreed to participate, the PI gave them a survey package including a self-administered questionnaire, a consent form, and a stamped return envelope. The participants returned the consent form and the survey questionnaire to the PI in person or by mail depending on the participant's preference. Out of a total of 285 distributed, 210 surveys were completed and returned (response rate = 72.9%). Ninety-seven completed surveys (46.2%) were received in person, and 113 (53.8%) were received by mail. Comparing the data collected in person or by mail, no differences were found in socio-demographics, access to health care, or CRC screening rates between the two groups. Participants did not report having any difficulties with the survey. Each participant received a \$20 grocery store gift certificate in person or by mail after the PI received the completed questionnaire.

### Data analysis

Data were entered and all analyses were conducted using SPSS Version 23 (Statistical Package for Social Sciences Inc, 2016). Descriptive statistics were calculated for participants' characteristics and use of CRC screening. Regarding socio-demographic variables, access to health care variables, and CRC screening utilization by locations, means, standard deviations, and ranges were reported for interval or ratio variables, and numbers and percentages were reported for categorical variables. To determine the associations between socio-demographic variables and access to health care with CRC screening utilization by location of tests, multinomial logistic regression was conducted.

## Results

### Sample Characteristics

Socio-demographic and health-related characteristics are shown in Table 1. A total of 210 KAs aged 50 and older living in the Chicago metropolitan area were surveyed. The mean age was 62.54, ranging from 50-84. Both women (61%) and men (39%) participated in this study. The majority of participants were married (81.9%), reported an annual household income of more than \$50,000 (74.8%) and had lived in the US for more than 20 years (74.8%). More than half of the participants spoke some English (67.6%) and their usual source of health care was in the US (61.4%). More than half of the participants (57.9%) had health insurance such as commercial insurance, Medicare, or Medicaid, and 15.2% had two or three kinds of health insurance.

### Prevalence of CRC Screening

Overall, 133 (63.3%) of the participants had had CRC screening during their lifetime, and 119 (56.7%) had had up-to-date CRC screening (Table 2). When the screening

data were examined by location, a total of 40 (19.0%) KAs had visited Korea to undergo CRC screening, including those who had had the lifetime CRC screening only in Korea (N = 28, 13.3%) as well as in both Korea and the US (N = 12, 5.7%) while 93 (44.3%) had had the lifetime CRC screening only in the US (Table 2).

Table 3 summarizes the results of screening rates for FOBT, flexible sigmoidoscopy, and colonoscopy, along with the locations of each lifetime screening test. Among the 210 participants, 48 (22.9%) had had lifetime FOBT, 8 (3.8%) had had FOBT in the previous year, 49 (23.3%) had had lifetime sigmoidoscopy, 42 (20.0%) had had sigmoidoscopy in the preceding 5 years, 122 (58.1%) had had lifetime colonoscopy, and 115 (54.8%) had had colonoscopy in the previous 10 years.

Regarding the locations of lifetime CRC screening, of the 210 KAs, a total of 15 (7.1%) visited Korea for FOBT, including KAs who had had FOBT in Korea only (N = 12, 5.7%) and in both Korea and the US (N = 3, 1.4%), whereas 33 (15.7%) had had FOBT in the US only. A total of 9 (4.3%) KAs visited Korea for flexible sigmoidoscopy, including those who had had it in Korea only (N = 6, 2.9%) and in both Korea and the US (N = 3, 1.4%), whereas 40 (19.0%) had had it in the US only. A total of 32 (15.2%) KAs visited Korea for colonoscopy, including KAs who had had it in Korea only (N = 30, 14.3%) only and in both Korea and the US (N = 2, 1.0%), whereas 90 (42.9%) had had it in the US only (Table 3).

### Factors Associated with KA CRC Screening Utilization by Location

To determine relationships among socio-demographic factors, access to health care, and lifetime CRC screening utilization by location, multinomial logistic regression using SPSS was conducted. KA participants who had lifetime CRC screening in both Korea and the US were rare (n=12), which could affect statistical test results. Therefore, three groups of KA participants who had had lifetime CRC screening in Korea, in the US, and had not had lifetime CRC screening were included in multinomial logistic regression. All variables were entered into the multinomial logistic regression model. Table 4 shows the results of the multinomial logistic regression analysis.

Based on the multinomial logistic regression, the variable "usual source of health care in the US" were significantly associated with higher odds of having had lifetime CRC screening in the US when the reference category was KAs who had not had CRC screening (P<0.05) (Table 4). The variable "health insurance in the US" and having had lifetime CRC screening were marginally significant. After controlling for other variables, KAs who had a usual source of care in the US had more than 8 times greater odds of having had CRC screening in the US (OR=8.45, 95% CI 3.39, 21.10) compared to KAs who did not have a usual source of health care in the US. Additionally, KAs who had health insurance in the US had marginally higher odds of having had lifetime CRC screening in the US (OR = 2.54, 95% CI 0.98, 6.59) than those who did not have health insurance in the US.

Table 1. Socio-Demographic and Health-Related Characteristics of KAs (n = 210)

Variable	n (%)	M ± SD	Range
Age (year)			
50-64	130 (61.9)	62.54 ± 8.75	50-84
≥65	80 (38.1)		
Gender			
Male	82 (39.0)		
Female	128 (61.0)		
Years in the US			
<20	53 (25.2)	25.18 ± 10.13	1-52
≥20	157 (74.8)		
Marital Status			
Currently married	172 (81.9)		
Not married	38 (18.1)		
Education			
≤High school graduate	85 (40.5)		
>High school graduate	125 (59.5)		
Employment			
Unemployed	131 (62.4)		
Employed	79 (37.6)		
Usual source of health care in the US			
Yes	129 (61.4)		
No	81 (38.6)		
Health insurance in the US			
Yes	121 (57.9)		
No	89 (42.1)		
Household income			
≤\$50,000	157 (74.8)		
>\$50,000	53 (25.2)		
English-speaking			
None	32 (15.2)		
Some	142 (67.6)		
Well	36 (17.1)		

## Discussion

This is the first study to examine CRC screening utilization and to explore factors related to CRC screening among KAs by location of CRC screening: specifically, in Korea, the US, and both. Prevalence rates and correlates of lifetime CRC screening, up-to-date CRC screening, and three CRC screening tests (FOBT, flexible sigmoidoscopy, and colonoscopy) were measured, in contrast to previous studies that only examined one or two of the CRC screening methods.

Although only a few studies on lifetime CRC screening for KAs (i.e., having ever had either FOBT, flexible sigmoidoscopy, or colonoscopy) are available, we found that the 63.3% rate of lifetime CRC screening among KAs in this study was lower than that of the general US population (73%) according to the California Health Interview Survey (Maxwell and Crespi, 2009). Additionally, the rate of up-to-date CRC screening (i.e., having had either FOBT in the previous year,

Table 2. Lifetime and Up-to-date CRC Screening (n = 210 Unless Otherwise Specified)

Variable	n (%)
Lifetime CRC screening	
Ever had one	133 (63.3)
Never had one	77 (36.7)
Location of lifetime CRC screening (n=133)	
Korea	28(21.1)
The US	93(69.9)
Both Korea and the US	12(9.0)
Up-to-date CRC screening (n=133)	
Yes	119 (89.5)
No	14 (10.5)

Note. Lifetime CRC screening: Ever had FOBT, sigmoidoscopy, or colonoscopy in lifetime; Up-to-date CRC screening: Had FOBT in the previous 1 year or sigmoidoscopy in the previous 5 years or colonoscopy in the previous 10 years.

Table 3. Fecal Occult Blood Test (FOBT), Flexible Sigmoidoscopy, and Colonoscopy Utilization among KAs (n = 210 Unless Otherwise Specified)

Screening	Variable	n (%)
FOBT	Heard about FOBT	
	Yes	101 (48.1)
	No	109 (51.9)
	Lifetime FOBT test	
	Ever had one	48 (22.9)
	Never had one	162 (77.1)
	Location of lifetime FOBT (n=48)	
	Korea	12 (25.0)
	The US	33 (68.8)
	Both Korea and the US	3 (6.2)
	FOBT in the previous 1 year (n=48)	
Yes	8 (19.0)	
No	34 (81.0)	
Flexible sigmoidoscopy	Heard about flexible sigmoidoscopy	
	Yes	76 (36.2)
	No	134 (63.8)
	Lifetime flexible sigmoidoscopy	
	Ever had one	49 (23.3)
	Never had one	161 (76.7)
	Location of lifetime flexible sigmoidoscopy (n=49)	
	Korea	6 (12.3)
	The US	40 (81.6)
	Both Korea and the US	3 (6.1)
	Flexible sigmoidoscopy in the previous 5 years (n=49)	
Yes	42 (85.7)	
No	7 (14.3)	
Colonoscopy	Heard about colonoscopy	
	Yes	167 (79.5)
	No	43 (20.5)
	Lifetime colonoscopy	
	Ever had one	122 (58.1)
	Never had one	88 (41.9)
	Location of lifetime colonoscopy (n=122)	
	Korea	30 (24.6)
	The US	90 (73.8)
	Both Korea and the US	2 (1.6)
	Colonoscopy in the previous 10 years (n=122)	
Yes	115 (94.3)	
No	7 (5.7)	

sigmoidoscopy in the previous 5 years, or colonoscopy in the previous 10 years) of 56.7% among KAs in this study is somewhat below the rate of 59.1% for the general US population (American Cancer Society, 2014).

Regarding each CRC screening test, a lower percentage of women reported lifetime FOBT (22.9%) and the rate of having received FOBT in the previous year (3.8%) in this study than in another study of KAs aged 50 and older (48.7% and 19.9% respectively) (Lee and Im, 2013). Because no studies have measured lifetime and up-to-date

flexible sigmoidoscopy, this study revealed unique data on the rates of flexible sigmoidoscopy utilization. We were surprised to find that the lifetime colonoscopy rates among KAs (58.1%) in this study were higher than in other studies of KAs (34.9%) (Lee and Im, 2013). Although the different results of CRC cancer screening studies among KAs may be attributed to small sample selection in studies with different ages and genders in regional areas, we found the up-to-date colonoscopy rate among KAs (54.8%) in this study to be similar to that of the general US population

Table 4. Multinomial Logistic Regression Analysis: Predictors of Lifetime CRC Screening by Location of Screening (n = 198 Unless Otherwise Specified)

Location	Variable	n (%)	Odd ratio	95% CI	p-value
Korea <sup>a</sup>	Age				
	50-64	17 (60.7)	1	reference	
	≥65	11 (39.3)	1.26	0.37-4.32	0.711
	Gender				
	Female	15 (53.6)	1	reference	
	Male	13 (46.4)	1.24	0.47-3.25	0.669
	Years in the US				
	<20	11 (39.3)	1	reference	
	≥20	17 (60.7)	1.04	0.36-2.99	0.941
	Marital status				
	Not married	4 (14.3)	1	reference	
	Married	24 (85.7)	1.25	0.31-4.99	0.754
	Education				
	>High school graduate	15 (53.6)	1	reference	0.232
	≤High school graduate	13 (46.4)	1.88	0.67-5.27	
	Employment				
	Not employed	20 (71.4)	1	reference	
	Employed	8 (28.6)	2.31	0.78-6.86	0.131
	Usual source of health care in the US				
	No	18 (64.3)	1	reference	
	Yes	10 (35.7)	1.05	0.35-3.16	0.938
Health insurance in the US					
No	18 (64.3)	1	reference		
Yes	10 (35.7)	0.74	0.23-2.40	0.614	
Household income					
>\$50,000	4 (14.3)	1	reference		
≤\$50,000	24 (85.7)	1.17	0.28-4.88	0.829	
English- speaking					
Well	4 (14.3)	1	reference		
Some	19 (67.9)	0.65	0.15-2.82	0.567	
None	5 (17.9)	0.88	0.12-6.71	0.905	
The US <sup>a</sup>	Age				
	50-64	48 (51.6)	1		
	≥65	45 (48.4)	0.68	0.22-2.05	0.488
	Gender				
	Female	60 (64.5)	1	reference	
	Male	33 (35.5)	0.82	0.35-1.88	0.631
	Years in the US				
	<20	13 (14.0)	1	reference	
	≥20	80 (86.0)	1.69	0.64-4.46	0.288
	Marital status				
	Not married	23 (24.7)	1	reference	
	Married	70 (75.3)	0.80	0.27-2.36	0.691
Education					
>High school graduate	52 (55.9)	1	reference		
≤High school graduate	41 (44.1)	1.80	0.75-4.31	0.189	

Table 4. Continued

Location	Variable	n (%)	Odd ratio	95% CI	p-value
The US <sup>a</sup>	Employment				
	Not employed	64(68.8)	1	reference	
	Employed	29(31.2)	2.59	0.95-7.04	0.063
	Usual source of health care in the US				
	No	11(11.8)	1	reference	
	Yes	82(88.2)	8.45	3.39-21.10	<.001
	Health insurance in the US				
	No	18(19.4)	1	reference	
	Yes	75(80.6)	2.54	0.98-6.59	0.055
	Household income				
	>\$50,000	27(29.0)	1	reference	
	≤\$50,000	66(71.0)	0.63	0.21-1.90	0.410
	English- speaking				
	Well	19(20.4)	1	reference	
Some	58(62.4)	0.70	0.22-2.23	0.542	
None	16(17.2)	1.45	0.25-8.70	0.668	

<sup>a</sup>, Reference category is KAs who had not had CRC screening

(56.4%) in 2010 (American Cancer Society, 2014), which is positive, as colonoscopy is the most sensitive method for the detection of CRC or adenomatous polyps (Nishihara et al., 2013).

Overall, none of the socio-demographic factors were associated with lifetime CRC screening by location, whereas access to health care factor (i.e., usual source of health care in the US) was associated with lifetime CRC screening among KAs who had undergone the test in the US. Considering the effect size (odds ratio), the usual source of health care in the US was a strong predictor of lifetime CRC screening (OR=8.45). If KAs had a usual source of health care in the US, they were 8 times more likely to have had lifetime CRC screening in the US than KAs who did not have a usual source of health care in the US. Previous cancer screening studies among KAs (Jo et al., 2008; Kim et al., 1998; Ko et al., 2016), however, have reported different results. In previous studies using bivariate analyses, the usual source of health care was found to be a significant factor associated with CRC screening behavior among KAs (Jo et al., 2008; Kim et al., 1998); however, the usual source of health care was not significantly correlated to KA utilization of CRC screening in studies using multivariate analysis (Kim et al., 1998; Ko et al., 2016), and in another study, it was deleted from the multivariate analysis because of many missing values (Jo et al., 2008).

Health insurance in the US was a marginally significant predictor of lifetime CRC screening in this study; that is, KAs who had health insurance in the US were more likely to have ever had CRC screening in the US compared to those who did not have health insurance in the US (OR=2.54). Previous cancer screening studies among KAs (Jo et al., 2008; Juon et al., 2003; Ko et al., 2016; Maxwell et al., 2000; Oh et al., 2013) are inconsistent in the relationship between health insurance in the US and CRC screening. Health insurance was a significant

predictor of lifetime FOBT among KAs aged 60 and older (Juon et al., 2003), yet it was not a significant predictor of lifetime sigmoidoscopy among KAs aged 60 and older (Juon et al., 2003) and of up-to-date CRC screening among KAs aged 50 and older (Maxwell et al., 2000; Oh et al., 2013), aged 40 to 70 (Jo et al., 2008), and aged 50-75 (Ko et al., 2016).

Although studies have identified socio-demographic characteristics and access to health care factors associated with CRC screening (Jo et al., 2008; Juon et al., 2003; Kim et al., 1998; Maxwell et al., 2000; Oh et al., 2013), this association was inconsistent in these studies. The conflicting results in these studies may be attributed to medical tourism. Medical tourism is defined as the phenomenon of people traveling abroad to access health care systems (Eissler and Casken, 2013; Hanefeld et al., 2013). One possible reason for inconsistent results in previous studies is that the samples in the previous studies combined KAs who visited Korea to have a CRC screening and KAs who had CRC screening in the US into one group. For example, when we asked, "Have you ever had a stool blood test?" without asking another question about location, such as, "Where did you have a stool blood test?" participants would answer "yes" regardless of where they had the screening. As shown in Table 4, more than 60% of KA participants who had undergone CRC screening in Korea did not have health insurance or a usual source of health care in the US. In this case, it was impossible to identify relationships between health care factors and CRC screening accurately because many KAs did not have health insurance or a usual source of health care in the US, but they had undergone CRC screening in Korea. The results of this study were more accurate than findings from previous studies because in this study, the CRC screening outcome variable was categorized by location of CRC screening. This study identified CRC screening utilization rates and specific factors associated

with CRC screening utilization by location as well as the effect sizes of predictors (e.g., health insurance and usual source of health care in the US). Our results are more precise compared to previous studies that investigated CRC screening among KAs without considering the location of CRC screening utilization.

Although KAs who went to Korea to have CRC screening could be medical tourists who visited Korea for the purpose of the screening, few studies on how many KAs travel to Korea for CRC screening are available. This study found that 40 of 210 KAs (19.0%) had visited Korea and undergone CRC screening, including KAs who had had lifetime CRC screening in Korea (N=28, 13.3%) as well as in both Korea and the US (N=12, 5.7%) while 93 (44.3%) had had lifetime CRC screening in the US (Table 2). One survey (Karuppan and Karuppan, 2010) found that only 26 (1.2%) of 2,168 Americans who were permanent residents or citizens of the US and aged 21 and older had traveled abroad and had general medical care, including routine physical examinations, which was much lower than the percentage of KA medical tourists in this study (19.0%). However, the sample in our study was made up of KAs who were immigrants from Korea (i.e., first-generation KA). Su and Wang (2012) found that first-generation Mexican immigrants were more likely to go to Mexico for health services than subsequent-generations. Mexican-Americans who are less acculturated into the US are more likely to go to Mexico for health services with or without controlling for the effects of health insurance and socio-demographic factors (Su and Wang, 2012). This finding indicates that, for first-generation immigrants, access to health care factors such as health insurance status and cultural factors may need to be considered when developing interventions to increase CRC screening.

This study has limitations. First, CRC screening behaviors among KAs are not entirely explained by differences in demographic characteristics and access to health care; thus, a better understanding of mutable factors, such as health beliefs or factors related to medical tourism, will be crucial for designing culturally appropriate interventions to promote CRC screening. Second, the cross-sectional nature of the data means that the variables are based on memories of past behaviors. A longitudinal study might be more effective in identifying causal relationships among the variables. Lastly, the generalizability of our findings to the entire population may be limited given that this study used a non-random sampling method with KAs in Chicago. Further research with a large random sample of KAs should be conducted to represent the entire population. Despite these limitations, this study revealed CRC screening rates and factors associated with CRC screening for KAs by location of screening (i.e., Korea, the US, or both Korea and the US), which provided more accurate information on CRC screening patterns and the direction of future practice and research for each group.

This study has implications for nursing practice. First, programs need to be developed to increase access to health care because it was found to be the most significant predictor of having CRC screening in the US.

Second, Korean cultural factors should be considered in developing interventions for KAs with different levels of acculturation. Lastly, it is important to connect those who have had CRC screening in Korea to health care in the US. For example, based on CRC screening results in Korea, appropriate follow-up treatment in the US should be given to KAs. Additionally, asking questions regarding any medical history in a foreign country would help health care professionals provide proper CRC diagnosis and treatment to KAs. Future research among all immigrant populations could lead to a better understanding of generational changes in international health care utilization (i.e., the likelihood of care-seeking among first and later generations of immigrants); could be used to compare international health care utilization rates among different immigrant populations; and could investigate immigrants' use of elective, necessary, and routine health care internationally compared to in the US and how health insurance status influences that.

In conclusion, location of CRC screening utilization needs to be considered in future cancer screening research in the context of medical tourism. This study examined CRC screening utilization and location of CRC screening among KAs and found that 19.0% of KAs had visited Korea and undergone CRC screening in their lifetimes, which had not been shown in previous research. CRC screening utilization among KAs was analyzed by location of CRC screening, and we found that access to health care in the US was a factor significantly associated with having had CRC screening in the US. Determining the location of KAs' CRC screening would enable a more accurate understanding of the factors related to it. The findings of this study could be used to help understand access to health care and medical tourism in other immigrant populations in the US.

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